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CLAIMS

1. Method for moulding three-dimensional products from a mass of foodstuff starting materials which are suitable for consumption, in particular a meat mass, comprising the steps of
  - a) filling a mould cavity, which is open on one side, with the mass of foodstuff starting materials which are suitable for consumption, which mould cavity is defined by a boundary comprising walls and base, in order to mould a moulded three-dimensional product; and
  - b) removing the moulded three-dimensional product from the mould cavity;characterized in that step b) comprises the removal of the adhesion forces between product and boundary of the cavity substantially simultaneously at all the interfaces between the moulded three-dimensional product and the boundary.
2. Method according to claim 1, characterized in that a means for eliminating adhesion forces is used for the removal of the adhesion forces.
3. Method according to claim 2, characterized in that the medium for eliminating adhesion forces is selected from the group consisting of an optionally permanent coating of the mould cavity, a visco-elastic material and a forcing fluid.
4. Method according to one of the preceding claims, characterized in that the boundary is provided with passages with openings, a pressurized fluid being fed to the passages.
5. Method according to claim 4, characterized in that the boundary comprises a porous structure of intercommunicating pores.
6. Method according to claim 4 or 5, characterized in that the porous structure is made from sintered metal.

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7. Method according to one of the preceding claims, characterized in that during step a) air which is enclosed between the mass and the boundary is discharged via the boundary.

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8. Device for moulding three-dimensional products from a mass of foodstuff starting materials which are suitable for consumption, in particular a meat mass, comprising a moulding surface, which is provided on one side with one or more mould cavities which are open on one side and are defined by a boundary comprising walls and base, a mass feed member, which is arranged at a mass feed position, for feeding the said mass to the mould cavities, characterized in that the device comprises means for applying a medium for eliminating adhesion forces between the boundary (66, 68) of a mould cavity (60) and a moulded product (78).

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9. Device according to claim 8, characterized in that the said means comprise excess-pressure means for supplying a pressurized fluid which are in fluid communication with the boundary of a mould cavity.

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10. Device according to claim 9, characterized in that the boundary (66, 68) is provided with passages (200) with openings, which passages (200) are in communication with the excess-pressure means.

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11. Device according to claim 10, characterized in that the boundary (66, 68) comprises a porous structure of intercommunicating pores (73).

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12. Device according to claim 11, characterized in that the porous structure is made from sintered metal.

13. Device according to claim 8, characterized in that the said means comprise an optionally permanent coating of the boundary of a mould cavity (60).

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14. Device according to one of the preceding claims, characterized in that the device also comprises reduced-pressure means for forming a reduced pressure in a mould cavity.

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15. Device according to claim 14, characterized in that a connecting passage (76) is in communication with the boundary (66, 68) of a mould cavity (60), which connecting passage (76) can be selectively coupled to the reduced-pressure means and the excess-pressure means.

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16. Device according to one of the preceding claims, characterized in that the moulding surface is made from a sintered metal in which the mould cavities (60) have been formed by spark erosion.

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17. Moulding device according to one of the preceding claims, characterized in that the moulding surface is provided with recesses (42) in which corresponding inserts (44) are removably accommodated, which inserts (44) comprise the mould cavities (60).

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18. Device according to one of the preceding claims, characterized in that the moulding surface is the wall (252) of a drum (16) which can be rotated in a direction of rotation by associated drive means and is provided with at least one mould cavity (60) which is open on the outer circumference of the drum and has an associated boundary comprising walls (66) and base (68).

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19. Moulding device for moulding three-dimensional products from a mass of foodstuff starting materials which are suitable for consumption, comprising

- a drum which can be rotated in a direction of rotation by associated drive means and has a drum wall which is provided with at least one mould cavity which is open on the outer circumference of the drum and is delimited by a boundary comprising walls and base,

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- a mass feed member for supplying the said mass to the

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mould cavity, which is arranged at a mass feed position along the outer circumference of the drum, and  
- reduced-pressure means for forming a reduced pressure in the mould cavity,

5 characterized in that around the outer circumference of the drum (16) there is a strip (86), the strip being provided, at the location of a mould cavity (60), with a flexible premould (90) which substantially corresponds to the mould cavity.

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20. Moulding device according to claim 19, characterized in that the flexibility of the premoulds (90) is greater than the flexibility of the surrounding part of the strip.

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21. Moulding device according to one of the preceding claims 19 or 20, characterized in that the strip (86) has a sandwich structure, which structure comprises a layer (88) comprising flexible premoulds (90) made from a first plastics material, and a layer (92) with openings (94) in it, the periphery of which openings substantially corresponds to that of the flexible premoulds (90), made from a second plastics material with a higher rigidity than the first plastics material.

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25 22. Moulding device according to one of the preceding claims 19-21, characterized in that the plastics material of the layer (86; 88) comprising flexible premoulds is a thermoplastic elastomer.

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30 23. Moulding device according to one of the preceding claims 19-22, characterized in that the premoulds (90) are produced by thermoforming.

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35 24. Moulding device according to one of the preceding claims 19-23, characterized in that at the outer periphery the strip (86) is protected by a protective strip (104) of wear-resistant material, in which there are openings (106), the periphery of which substantially corresponds to the periphery of the premoulds (90) in the strip (86).

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25. Moulding device according to claim 24, characterized in that the wear-resistant material is a metal or metal alloy.
- 5 26. Moulding device according to one of the preceding claims 19-25, characterized in that the device also comprises excess-pressure means which are in communication with the mould cavity (60) and are designed to feed a pressure medium to the mould cavity (60).
- 10 27. Strip (86) clearly intended for use in a moulding device having at least one mould cavity according to one of the preceding claims 19-26, which strip (86) is provided, at the location of a mould cavity (60), with a flexible premould (90) which substantially matches the mould cavity.
- 15 28. Strip according to claim 27, characterized in that the flexibility of a premould (90) is greater than the flexibility of the surrounding part of the strip (86).
- 20 29. Strip according to one of the preceding claims 27-28, characterized in that the strip (86) has a sandwich structure, which structure comprises a layer (88) with flexible premoulds (90) made from a first plastics material, and a layer (92) in which there are openings (94), the periphery of which substantially corresponds to that of the flexible premoulds (90), made from a second plastics material with a higher rigidity than the first plastics material.
- 25 30. Strip according to one of the preceding claims 27-29, characterized in that the plastics material of the layer (86; 88) comprising flexible premoulds (90) is a thermoplastic elastomer.
- 30 31. Strip according to one of the preceding claims 27-30, characterized in that the premoulds (90) are produced by thermoforming.
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32. Assembly of a strip according to one of the preceding claims 27-31 and a protection strip (104) made from wear-resistant material in which there are openings (106), the periphery of which substantially corresponds to the periphery of the premoulds (90) in the strip (86).
33. Assembly according to claim 32, characterized in that the wear-resistant material is a metal or metal alloy.
34. Moulding device for moulding three-dimensional products from a mass of foodstuff starting materials which are suitable for consumption, comprising
- a drum which can be rotated in a direction of rotation by associated drive means and has a drum wall which is provided with mould cavities which are open at the outer circumference of the drum and are defined by a boundary comprising walls and a base;
  - a mass feed member for feeding the said mass to the mould cavities, which is arranged at a mass feed position along the outer circumference of the drum; and
  - reduced-pressure means for forming a reduced pressure in the mould cavities,
- characterized in that the boundary (66, 68) is at least in part provided with a large number of fine openings which are in communication with the reduced-pressure means.
35. Moulding device according to claim 34, characterized in that the boundary (66, 68) comprises a porous structure of intercommunicating pores (73).
36. Moulding device according to claim 34, characterized in that the porous structure of the boundary (66, 68) is made from sintered steel.
37. Moulding device according to one of the preceding claims 34-36, characterized in that the outer circumference of the drum (16) is provided with recesses (42) in which corresponding inserts (44) are removably accommodated, which inserts (44) comprise the mould cavities (60).

38. Moulding device according to one of the preceding claims 34-37, characterized in that the device also comprises excess-pressure means which are in communication with the openings (73) in the boundary (66, 68) of a mould cavity (90) and are designed to supply a pressure medium to the mould cavity (60).
39. Moulding device according to one of the preceding claims 34-38, characterized in that there is an opening (52) in the base (48) of the recess (42).
40. Moulding device according to one of the preceding claims 34-39, characterized in that a connecting passage (76) is in communication with the opening (52) in the base (48) of the recess (42), which connecting passage (76) can be selectively connected to the reduced-pressure means and the excess-pressure means.
41. Moulding device according to one of the preceding claims 8-26, in particular according to one of the preceding claims 19-26 or 34-40, characterized in that the device is provided with a release device (24), which is arranged at a release position, for removing the moulded products (78) from the mould cavities (60).
42. Moulding device according to claim 41, characterized in that the release device (24) comprises drivable endless conveyors (120) which are arranged in parallel and describe a movement path around turning elements (122), and between which conveyors (120) there are connecting elements (136), in such a manner that the connecting elements (136), at the release position, pass substantially through the centre of the axis of the turning element (122) in question.
43. Moulding device according to claim 42, characterized in that the endless conveyors (120) comprise chains, the links (132) of which comprise an inwardly projecting part (134) to which transverse spindles (136) are connected.

44. Moulding device according to one of the preceding claims 8-26 or 34-40, characterized in that the mass feed member (18) comprises a housing (140) in which there is a through-  
5 passage (142) for mass to pass from an inlet (144) to an outlet (146) located on the drum side, the drum side bearing in a sealing manner against the drum (16) and being designed to adapt to irregularities in the outer circumference of the drum (16).
- 10 45. Moulding device according to claim 44, characterized in that the drum side of the mass feed member (18) comprises a flexible plate (158) which bears against the outer circumference of the drum (16) under pressure as a result  
15 of pressure means.
46. Moulding device according to claim 45, characterized in that the pressure means comprise one or more pressure cushions (160), a number of lamellae (154), which are  
20 positioned transversely to the direction of rotation of the drum, being arranged between a pressure cushion (160) and the plate (158).
- 25 47. Moulding device according to one of the preceding claims 44-46, characterized in that the drum side of the mass feed member (18), as seen in the circumferential direction of the drum, extends on either side of the outlet (146), over a distance which covers at least one mould cavity (60).
- 30 48. Moulding device according to one of the preceding claims 44-47, characterized in that there is a cutting device (170) in the through-passage (142) on the drum side of the mass feed member (18).
- 35 49. Release device (24) for removing moulded products (78) from one or more mould cavities (60) of a moulding device, comprising drivable endless conveyors (120) which are arranged in parallel and describe a movement about turning elements (122), between which conveyors (120) there are



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connecting elements (136), in such a manner that the connecting elements (136), at the release position, pass substantially through the centre of the axis of the turning element (122) in question.

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50. Release device according to claim 49, characterized in that the endless conveyors (120) comprise chains, the links (132) of which comprise an inwardly projecting part (134) to which transverse spindles (136) are connected.

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51. Mass feed member (18) for feeding a mass of foodstuff starting materials which are suitable for consumption, in particular a meat mass, to a mould cavity in the outer circumference of the drum of a moulding device, comprising a housing (140) with an inlet side and a drum side which is to face the drum, a through-passage (142) for mass to pass from an inlet (144) towards an outlet (146) located on the drum side, the drum side being designed to adjust in a sealing manner to irregularities in the outer circumference of the drum (16).

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52. Mass feed member according to claim 51, characterized in that the drum side of the mass feed member (18) comprises a flexible plate (158) which bears against the outer circumference of the drum (16) under pressure as a result of pressure means.

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53. Mass feed member according to claim 52, characterized in that the pressure means comprise one or more pressure cushions (160), a number of lamellae (154), which are positioned transversely with respect to the direction of rotation of the drum, being arranged between a pressure cushion (160) and the plate (158).

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54. Mass feed member according to one of the preceding claims 51-53, characterized in that the drum side of the mass feed member (18), as seen in the circumferential direction of the drum, extends on either side of the outlet (146), over a distance which covers at least one mould cavity (60).

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55. Mass feed member according to one of the preceding claims 51-54, characterized in that a cutting device (170) is provided in the through-passage (142) on the drum side.

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56. Moulding surface, in particular a moulding drum, for moulding three-dimensional products from a mass of foodstuff starting materials which are suitable for consumption, in particular from a meat mass, provided on one side with one or more mould cavities which are open on one side and are defined by a boundary comprising walls and a base, characterized in that the walls (66) and base (68) which form the boundary are provided with holes which extend through the boundary.

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57. Moulding surface according to claim 56, characterized in that the holes comprise passages (200) with openings which open out in the mould cavity (60).

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58. Moulding surface according to claim 56, characterized in that the holes comprise a porous structure of intercommunicating pores (73).

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59. Moulding surface according to claim 58, characterized in that the porous structure is made from sintered metal.

60. Moulding surface according to one of the preceding claims 56-59, characterized in that the moulding surface is made from a single piece.

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61. Moulding surface according to one of the preceding claims 56-60, characterized in that the shape of the mould cavities (60) is identical.

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62. Assembly of at least two moulding surfaces for moulding three-dimensional products, in particular moulding drums, according to one of the preceding claims 56-61, in which the shape of the mould cavities of one moulding surface is identical and differs from the shape of the mould cavities

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in another moulding surface.